HELICOPTER QUIETING PROGRAM

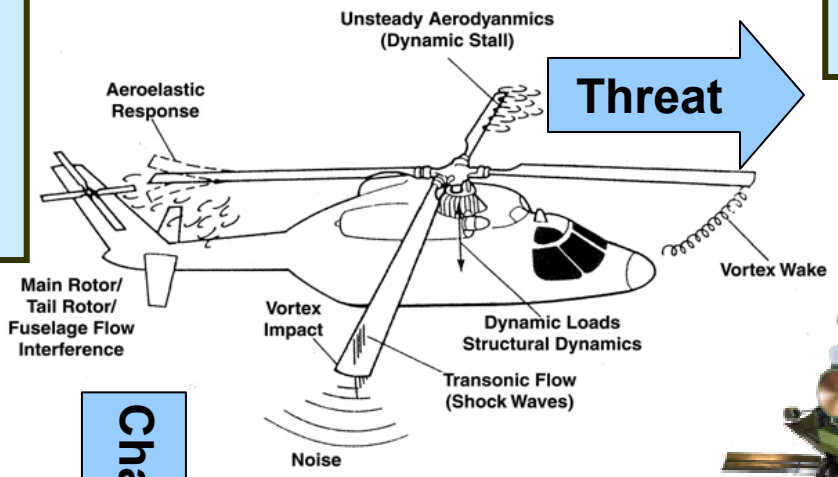
BAA Released: 11 March 2004

Proposals Due: 30 April 2004

Approved For Public Release
Distribution Unlimited

The Problem

Several complicated mechanisms contribute to the helicopter noise signature

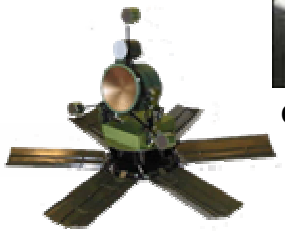


Threat

Challenge

This can be exploited by the enemy

Cueing of air defense systems

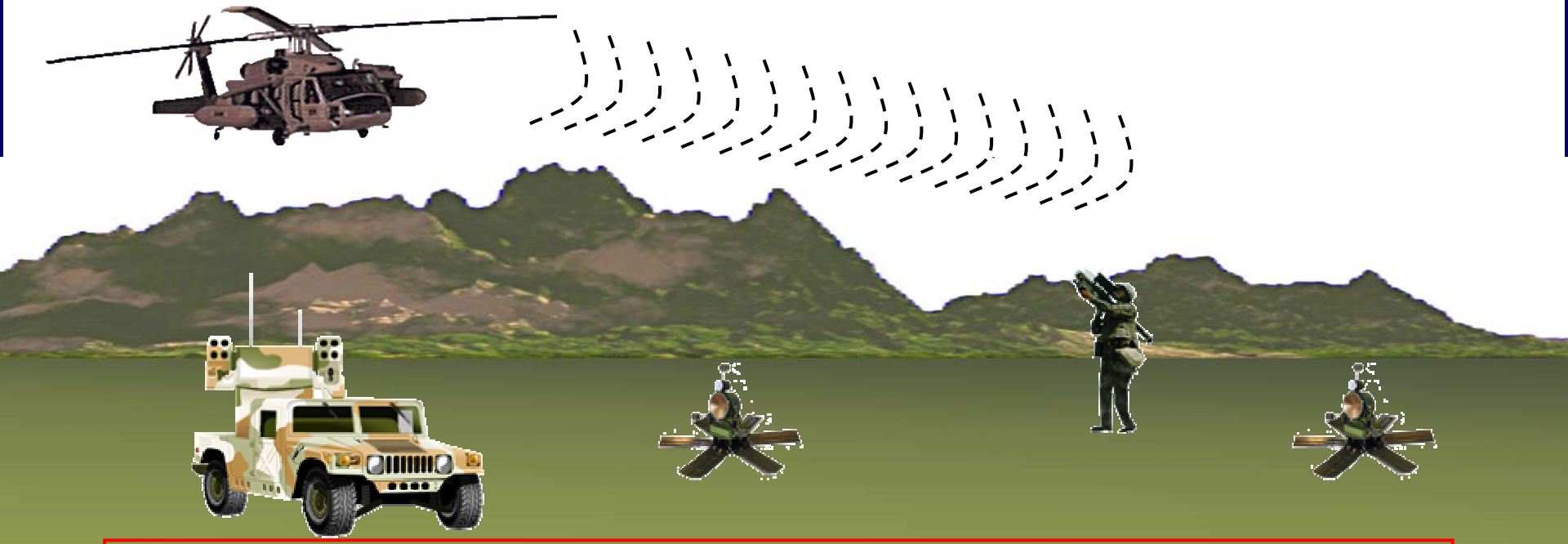


Anti-helicopter mine

- **Wind tunnel testing is very expensive and time consuming**
- **Most designs are based on empirical data - rotor designs are evolutionary rather than revolutionary**
- **Current SOA in modeling does not capture all of the physical effects in complex rotational flow**
- **Most "obvious" methods to reduce noise have a performance penalty**

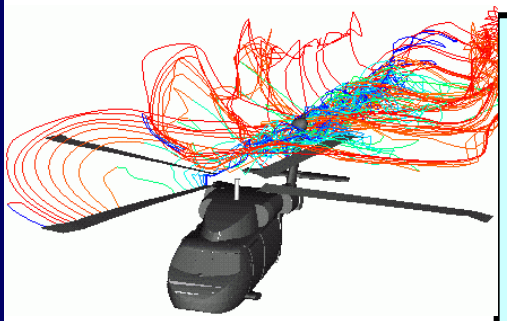
Program Objective

Reduce acoustic signature of a helicopter to minimize the probability of detection.



End of Program Goal: Order-of-magnitude reduction of low-frequency in-plane acoustic signature without a reduction in performance.

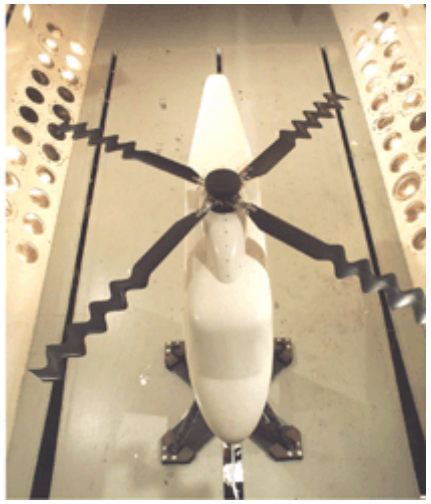
Program Overview



Create a new capability

- Develop physics-based, predictive design tools by leveraging high-end CFD techniques
- Validate models using existing data from both wind tunnel and field tests
- Advisors from government and industry provides guidance to ensure applicability of new tool

Phase 1



Develop a new design

- Design new blades that significantly reduce the low-frequency in-plane acoustic signature
- Verify design through wind tunnel testing

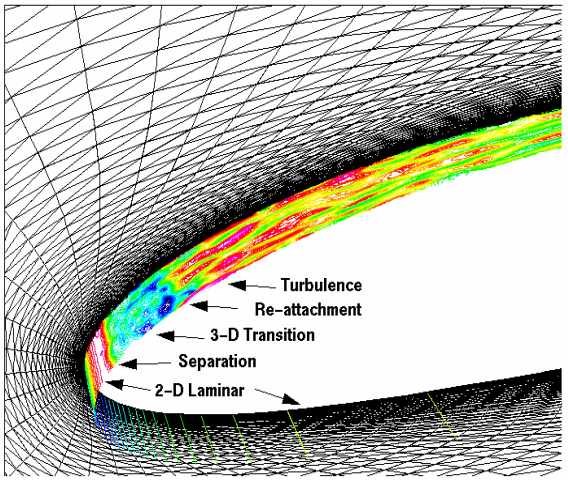
Phase 2

Flight testing of new design

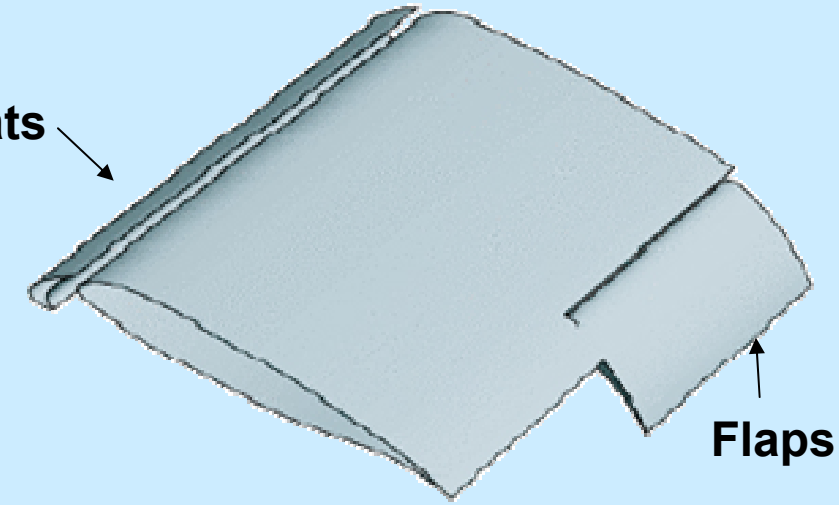
Phase 3

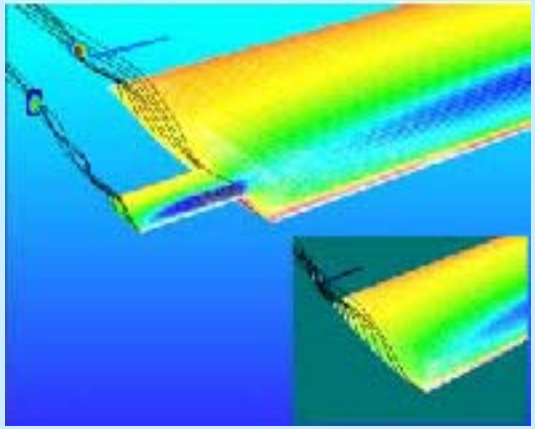
Possible Approach

- Exploit recent advances in computational fluid dynamics to develop a *physics-based* design tool that can *predict* the detailed blade loading and performance *regardless of blade shape*
- Utilize the tool to develop novel blade designs with vastly improved acoustic characteristics



POSSIBLE NOVEL BLADE DESIGNS





Unique tip designs

Tentative Schedule & Milestones